

Frequency of Different Ligament Tears in Knee Injury On Magnetic Resonance Imaging

Rida Fatima¹ Asifa Sadiq¹ Samia Sadiq¹ Memona Nazir¹ Hasnain Shazhad¹
Azhar Mehmood¹ Muhammad Tariq Aslam¹

1.University institute of Radiological Sciences and Medical Imaging Technology, Faculty of Allied Health Sciences, University of Lahore, Pakistan

Abstract:

Background: MRI had been useful in the diagnosis of ligament injuries and the tears were detected by non-invasive procedure. **Objective:** To determine the frequency of different ligament tears in knee injury on Magnetic Resonance Imaging. **Methods:** A descriptive cross-sectional was conducted with the sample size of 206 patients of both genders by selecting the convenient sampling from Ghurki Trust Teaching Hospital, Lahore. Out of 206 patients, 157 were males while 49 were females. Data was analyzed with the help of SPSS version 24. The results were derived by mean, frequency and standard deviation. **Results:** Findings shows that among 206 patients, with in age limit of 12 years to 70 years. 157(76.2%) were males and 49(23.7%) were female while 96(46.6%) were presented with ACL tear, 19(9.2%) were presented with PCL tears, 51(25.7%) were presented with MCL tears, 33(16.0%) patients were presented with LCL tears and all of these 206 patients were suffering from pain. **Conclusion:** We concluded that males are more prevalent than females and in this population the incidence of ACL tears is more than other ligament tears. Hence, ACL is proved to be the most injured ligament.

Keywords: Anterior cruciate ligament, Posterior cruciate ligament, Medial collateral ligament, Lateral collateral ligament and Magnetic resonance imaging.

DOI: 10.7176/JHMN/71-06

Publication date: February 29th 2020

Introduction

The largest joint in the body is knee joint which consist of vast network of ligaments and muscles. The most frequently injured joint in the body is knee joint. The presence of ligament provide greater stability to the knee joint¹. Anterior cruciate ligament is the main component in the knee joint because it withstand anterior and tibial movement and rotational loads and often injured structure and does not recover when torn². Due to higher prevalence during sporting exertion, Anterior Cruciate Ligament injury is significant harm to knee joint and also leave the subject with immobilize joint during physical exertion³. In the united states ACL injuries occur between 100000 to 200000 per year this shows that ACL is the most frequently injured ligament and mostly soccer players are at high risk of ACL injuries(53% of total) with athletes and skiers are also prone to ACL injuries⁴.The posterior cruciate ligament is known to be an intra-articular extra-synovial structure due to synovial capsule that lines the ligament ,its length is about 32-38mm with an area of 11mm² ,with its midstuff is three times smaller than the bony insertion of posterior cruciate ligament⁵. Posterior Cruciate Ligament injuries are minor quotidian than other knee ligament injuries, but they narrative for significant morbidity⁶.Superficial Medial collateral ligament is based on two attachment one is attachment of femur and the other is attachment of tibia and medial collateral ligament is also called tibial Collateral ligament and dense medial side of the joint capsule which is deep as compared to the superficial medial collateral ligament form the deep medial collateral ligament which comprises of meniscofemoral and meniscotibial constituent⁷.When intact, the superficial medial collateral ligament is the foremost immobile stabilizer to valgus deformity as compared to deep medial collateral ligament although when superficial medial collateral ligament is damaged, the major role of deep medial collateral ligament is to act as stabilizer in providing greater flexion angles and posteromedial capsule helps in extension⁸.The anatomy of lateral sides of knee is complicated pattern of stationary (ligament) and mobile (tendons and muscles) stabilizing framework and the entanglement of anatomy is because of progressive changes in the anatomic affiliation of fibular head , the popliteal tendon and the biceps femoris muscle, the role of the ligament is kind of mosaic and there essential act is to prevent abnormal motion⁹. For the evaluation of acute knee ligament tears, Magnetic resonance imaging scan have been seen to be greatly effective¹⁰.When Magnetic resonance imaging implemented right after the injury it shows to be the most accurate imaging technique for the knee and also helps those patients who need further treatment¹¹. Magnetic Resonance Imaging has immense effect on musculoskeletal scanning to often visualize the knee and signifies in those with suspicious damage of the menisci and cruciate ligament, Magnetic resonance imaging aids in evaluating the knee injuries due to its high soft tissue resolution¹².

In this study we had investigated the accuracy of MRI in those patients suffering with ligament (ACL, PCL, LCL and MCL) tears of the knee joint.

Methods

In this descriptive cross sectional study, 206 patients with history of pain were included all the patients had been collected from Ghurki Trust Teaching Hospital Lahore. After informed consent data were collected through 0.35 Tesla Hitachi machine. Patients having pain and with age ranging from 12 to 70 years were included. Tears of Anterior cruciate ligament, Posterior cruciate ligament, lateral collateral ligament and medial collateral ligaments were identified. T1, T2, proton density, axial and sagittal sequences were used to obtained images of knee ligaments.

Discussion

In the current study, it is depicted that out of total 206 patients whose age ranges from 12 years to 70 years were presented with pain. Out of these 206 patients, 157(76%) patients were males and 49(23.7%) were females. Among these 96(46.6%) were presented with ACL tears out of which 86(89.5%) were males and 10(10.41%) were females. Males showed increased incidence than females in ACL tears. These findings are similar to the study conducted by Singh Ap et.al which shows that total 75 patients were included out which 50(66.6%) appears to be males and the rest 25(33.3%) were females. ACL tears were appeared in 36(48%) patients. Males are shown to be more prevalent than females ¹. Current results were compared with similar study performed by Choi WR et.al in 2019. Out of 148 patients with anterior cruciate ligament rupture, 145 patients injured, among them 41 patients were found to be females and 107 patients were male. This result also described that males are more sufficiently affected than females ¹³. Similarly result of previous study performed by Selcan Koc in 2019, according to their study they took 102 patients out of which 46 (45.1%) patients had anterior cruciate ligament injuries ¹⁴.

This study showed that out of total 206 patients who clinically presented with pain 19 (9.2%) patients had PCL tears among which 18(94.7%) were Males and 1(5.2%) was female. Males are greatly affected than females. These findings are similar to the results of study conducted in 2007 by Laprade et.al. In their study they took 187 subjects among these 11(5%) had PCL tears ¹⁰. We correlate our results with a study conducted by JS. Grover which shows that they take 610 patients. Out of these patients 250(40.9%) were appeared to be females and 360(59.0%) were appeared as males. The age of the patients they have taken fall between 14 years to 86 years with the mean age appears to be 36 years. They illustrate that PCL injury occurs in 11(1.80%) patients. According to their study ACL is more frequently injured than PCL tears. A study was conducted to determine the frequency of different ligaments tear of knee joint ¹⁵.

The present cases of study showed 51(24.8%) were presented with MCL tears among which 38(74.5%) were males and the rest 13(25.4%) were females. According to gender wise distribution males were dominant as compared to females. While a study conducted by Singh Ap et.al, showed 13(17%) patients were presented with MCL tears ¹. The results are also compared with the study performed by Lundblad et.al which showed that they had taken 4364 football players from 51 teams. Out of these players 130(3%) presented with MCL injuries ¹⁶.

According to the present study, 33(16%) patients were presented with LCL tears among which 30(90.9%) were found to be Males and 3 (9.09%) were females. Similar results were related to the study by Singh Ap et.al during June 2018, which depicted that 2 (2.6%) patients were presented with LCL tears, the age group, which is mostly, affected range from 21 to 40 years, and the least affected group was 61 to 80 years ¹. This finding is also similar with the study conducted in 2007 by Laprade et.al, which shows that out of 187 subjects which were taken for study 4(2.1%) subjects had LCL tear ¹⁰.

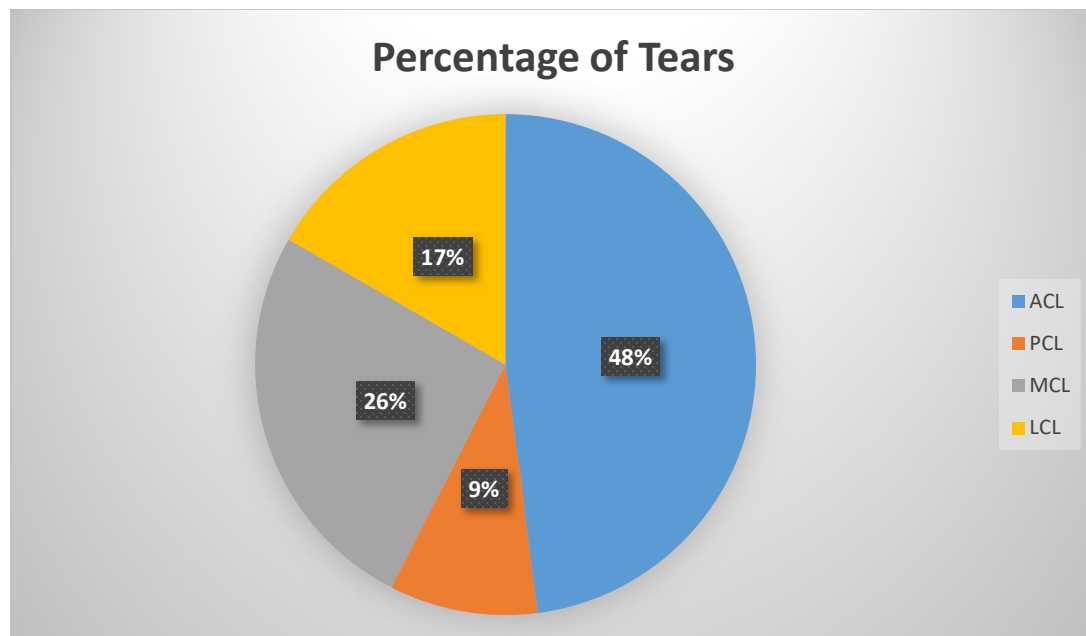
Results

Findings shows that among 206 patients, 157(76.2%) were males and 49(23.7%) were female while 96(46.6%) were presented with ACL tears, 19(9.2%) were presented with PCL tears, 51(25.7%) were presented with MCL tears, 33(16.0%) patients were presented with LCL tears All of these 206 patients were suffering from pain.

Table no 1: Frequency distribution of different ligament tears

No. of tears		ACL	PCL	MCL	LCL
206	YES	96 46.6%	19 9.2%	51 24.7%	33 16.0%
	NO	110 53.3%	187 90.7%	155 75.2%	173 83.9%

Table no.1 shows that among 206 patients, 157(76.2%) were males and 49(23.7%) were female while 96(46.6%) were presented with ACL tears, 19(9.2%) were presented with PCL tears, 51(25.7%) were presented with MCL tears, 33(16.0%) patients were presented with LCL tears .All of these 206 patients were suffering from pain.



This pie chart showing percentages of ACL (48%), PCL (9%), MCL(26%), LCL(17%) tears.

Table no 2: shows Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NO OF tears	206	.00	4.00	.9660	1.01396
Age	206	12.00	70.00	32.8641	12.47010
Valid N (listwise)	206				

Table no.2 shows that those patients included have minimum (0.00) tears and maximum (4.00) tears. Patients with minimum age of 12 years and maximum age of 70 years are included.

Table no.3: Shows Gender distribution

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid F	49	23.8	23.8	23.8
M	157	76.2	76.2	100.0
Total	206	100.0	100.0	

Table no.3 shows that out of total 206 patients 49(23.8%) were females and 157(76.2%) males were included.

Conclusion

We concluded that males are more prevalent than females and in this population the incidence of ACL tears is more than other ligament tears. Hence, ACL is proved to be the most injured ligament.

References

1. Singh Ap. MRI evaluation of ligamentous and meniscal injury of the knee joint. 2018; **8**(6).
2. Duthon V, Barea C, Abrassart S, Fasel J, Fritschy D, Ménétrey JJKs, sports traumatology, arthroscopy. Anatomy of the anterior cruciate ligament. 2006; **14**(3): 204-13.
3. Benjaminse A, Gokeler A, van der Schans CPJJoO, Therapy SP. Clinical diagnosis of an anterior cruciate ligament rupture: a meta-analysis. 2006; **36**(5): 267-88.
4. Siegel L, Vandenakker-Albanese C, Siegel DJCJoSM. Anterior cruciate ligament injuries: anatomy, physiology, biomechanics, and management. 2012; **22**(4): 349-55.
5. Voos JE, Mauro CS, Wentz T, Warren RF, Wickiewicz TLJTAjasm. Posterior cruciate ligament: anatomy, biomechanics, and outcomes. 2012; **40**(1): 222-31.
6. Seddek S, Choudry Q, Karunatilake N, Arshad M. Posterior cruciate ligament injury: Diagnosis and management.
7. Wijdicks CA, Griffith CJ, Johansen S, Engebretsen L, LaPrade RFJJ. Injuries to the medial collateral ligament and associated medial structures of the knee. 2010; **92**(5): 1266-80.

8. Craft JA, Kurzweil PRJSm, review a. Physical examination and imaging of medial collateral ligament and posteromedial corner of the knee. 2015; **23**(2): e1-e6.
9. Da Silva MVJKs, sports traumatology, arthroscopy. Anatomy of the lateral collateral ligament: a cadaver and histological study. 2006; **14**(3): 221-8.
10. LaPrade RF, Wentorf FA, Fritts H, Gundry C, Hightower CDJATJoA, Surgery R. A prospective magnetic resonance imaging study of the incidence of posterolateral and multiple ligament injuries in acute knee injuries presenting with a hemarthrosis. 2007; **23**(12): 1341-7.
11. Naraghi AM, White LMJR. Imaging of athletic injuries of knee ligaments and menisci: sports imaging series. 2016; **281**(1): 23-40.
12. Behairy NH, Dorgham MA, Khaled SAJIo. Accuracy of routine magnetic resonance imaging in meniscal and ligamentous injuries of the knee: comparison with arthroscopy. 2009; **33**(4): 961-7.
13. Choi WR, Yang J-H, Jeong S-Y, Lee JKJPo. MRI comparison of injury mechanism and anatomical factors between sexes in non-contact anterior cruciate ligament injuries. 2019; **14**(8).
14. Koç ASJA. The Efficacy of 0.2 Tesla Open Magnetic Resonance Imaging Scanner in the Diagnosis of Anterior Cruciate Ligament Injury. 2019; **38**: 14.
15. Grover J, Bassett L, Gross M, Seeger L, Finerman GJR. Posterior cruciate ligament: MR imaging. 1990; **174**(2): 527-30.
16. Lundblad M, Häggglund M, Thomeé C, et al. Medial collateral ligament injuries of the knee in male professional football players: a prospective three-season study of 130 cases from the UEFA Elite Club Injury Study. 2019: 1-7.